

Topographical Distribution of EMG Activity in the Upper Trapezius Muscle in People With Myofascial Trigger Points

Barbero, Marco; Falla, Deborah; Cescon, Corrado

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Response to a Letter to the Editor

We thank Dr John Z Srbely and his collaborators for their comments and interest in our recently published paper evaluating the topographical distribution of activity in the upper trapezius muscle in subjects with and without myofascial trigger points (MTrP).

To conduct the correlation analysis, an anatomical landmark system with the X-axis parallel to fibers of the upper trapezius muscle, was drawn, and subsequently the rows of the electrode grid were positioned parallel to the X-axis. Using this electrode placement, EMG signals were analyzed in longitudinal single differential configuration (along the direction of the fibers), determining a redundancy of information in the four EMG signals of each row (Figure 2). Motor unit action potentials propagate along the muscle fiber direction, thus all of the channels on the same row carry redundant information. For this reason, the locations of the peak EMG amplitude were computed considering only their distance along the Y-axis. Consistently, the analysis to test the correlation between the location of the peak EMG amplitude and the MTrP location was performed using the distance along the Y-axis. This implies that the distance between the MTrP and the electrode grid along the X-axis was not relevant.

The drawings represented in Figure 3 are examples from four representative subjects, thus their behavior do not show the variability of the entire sample. Since the contractions are isometric force ramps, the initial value can be considered ideally the value at the left edge of the map (and since the ramps are symmetric, the same value should be approximately visible in the right edge of the map). The black line drawn inside the maps represent the instantaneous peak position in the Y-axis for each vertical slice of the map. When the muscle fibers are active, the peak position is clearly identified (i.e. in the middle portion of the map), while when the muscle is at rest or contracting at low intensities, the low signal to noise ratio increases the variability of peak position. Thus the initial value and direction of movement did not show any significant difference between groups and force levels, and we could have chosen subjects with opposite behavior as examples in the figure. The surface EMG signals do not allow the identification of the “baseline activity” and/or the “sustained spontaneous EMG activity” reported by Hubbard and Berkoff (1993), especially when the signals are analyzed in longitudinal single differential configuration. Indeed, both of those EMG measures were recorded at the MTrPs’ site (1-2 mm nidus) using a monopolar needle EMG. For this reason, we did not normalize the EMG amplitude with respect to the baseline activity.

Regarding the activation of the upper trapezius muscle, we observed non uniform activation during the 60%MVC ramps and not in the 15%MVC ramps, while the caudal shift was observed in the group with MTrPs compared to the control group at both contraction levels. The two statistical findings are represented in Figure 5c and 5d, where the asterisks above the box-whisker plots highlight the caudal shift between groups, while the asterisks in the lower part of Figure 5d represent the non-uniform activation of both groups during the 60%MVC ramp.

Eventually, we agree that a larger sample size would have increased the statistical power of the analysis and possibly highlight different aspects of the analysis.

Marco Barbero
University of Applied Sciences and Arts of Southern Switzerland

Deborah Falla
University of Birmingham, United Kingdom

Corrado Cescon
University of Applied Sciences and Arts of Southern Switzerland